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TITLE: SEMICONDUCTOR SOLID-STATE IMAGE PICKUP DEVICE

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ABSTRACT:

PURPOSE: To obtain the perfect airtightness by subjecting a seal ring part of a window metallic frame to seam welding to stick a glass plate to the window part whose edge is bent into L-shape to enable the sealing of low temperature such that a filter is not deteriorated.

CONSTITUTION: In a lamination ceramic body 1, a metallic layer 12 is arranged at the bottom of a recess, and a sealing part 9 on an upper surface of the circumferential part and an external lead 14 on the side plane are arranged. A chip 2 of a solid body image pickup device is bonded on the

metallic layer 12 by an adhesive 13 and a filter 4 is bonded to the upper surface of chip 2 through an adhesive layer 3. Meanwhile, in a metallic frame 15 of window-frame form of a cap 8, the edge of the window part is bent into L-shape and a transparent glass plate 6 is stuck through a low-melting-point glass 7. Then the package base and the cap 8 are overlapped and the overlapped part of the frame 15 and the seal ring part 9 is sealed by welding with a seam welder.

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## Specification

### 1. Title of Invention

Semiconductor Solid Image Pick-up Device

### 2. Claim

A semiconductor solid image pick-up device, characterized by being comprised of the following components: a package base that supports a solid image pick-up device and that has a seal ring section; a window frame like metal frame that is seam-welded to the seal ring section and in that a glass sheet is fixed in a window whose rim is bent into an L shape.

### 3. Detailed Description of the Invention

#### [Field of Industrial Application]

This invention pertains to semiconductor solid image pick-up devices such as charge coupling devices (CCDs). In particular, this invention relates to semiconductor solid image pick-up devices that use ceramic packages.

#### [Prior Art]

Solid image pick-up devices usually need to be protected by shielding them from an outer atmosphere so as to improve the reliability. However, when filters of the semiconductor solid image pick-up devices are heated to high temperatures, they deteriorate. Due to this problem, during a bonding of package bases and transparent glass sheets, it is difficult to obtain a complete airtight sealing using glass for the sealing materials. In order to improve the situation, organic adhesives are used. It results in an insufficient air-tightness. A strict reliability test cannot be conducted.

#### [Purpose of the Invention]

The purpose of the invention is to offer a semiconductor solid image pick-up device that can perform a low temperature sealing at a degree wherein a filter does not deteriorate and obtain a complete air-tightness.

#### [Constitution of the Invention]

The semiconductor solid image pick-up device of the invention is comprised of the following components: a package base that supports a solid image pick-up device and that has a seal ring section; a window frame like metal frame that is seam-welded to the seal ring section and in that a glass sheet is fixed in a window whose rim is bent into an L shape.

#### [Effect of the Invention]

Since the sealing process is performed by the seam-welding means, the semiconductor solid image pick-up device of the invention is completely sealed so as to

maintain a semiconductor chip at a low temperature at 120 to 130°C or lower. Because the periphery of the window of the window frame like metal frame is bent in the L shape, the mechanical strength to the outer pressure can be sufficiently maintained. Thus, the airtightness of the semiconductor solid image pick-up device improves.

[Embodiment]

The embodiment of the invention is described hereinbelow with reference to the drawing.

Fig.1 is a cross-sectional view illustrating a semiconductor solid image pick-up device as in an embodiment of the invention. A package base provides the following components at the following locations: a tungsten-nickel-gold layer 12 provided on the bottom of a recess of a laminate ceramic article 1 formed by laminating and sintering ceramic sheets; a seal ring section 9 provided on the upper surface around laminate ceramic article 1, which is made of a gold-tin alloy; an outer lead 14 provided on the side surface. A chip 2 of a solid image pick-up device such as a CCD is adhered on metal layer 12 by applying an adhesive 13 such as a silver (Ag) paste. A filter 4 is adhered on the upper surface of chip 2 via a proper adhesive layer 3. A fine metal wire 5 is wired so as to electrically connect chip 2 and outer lead 14. As filter 4 does not have any heat resistance, it is necessary to apply a sealing process at a low temperature.

A window frame like metal frame 15 of a cap 8 is bent so that the location around the window opened at the center has a step. A transparent glass surface sheet 6 such as sapphire glass or cobalt glass is fixed on a glass attaching surface one step lower via lower melting point glass 7. Furthermore, a nickel (Ni) plating or a tin (Sn) plating is

applied onto the entire surface of cap 8 except for transparent glass surface sheet 6 and lower melting point glass 7. As a rim 10 on the glass attaching surface of window frame like metal frame 15 has a L-shaped structure, the mechanical strength to the outer pressure is sufficiently maintained. The air-tightness of the semiconductor solid image pick-up device is also ensured.

The package base as structured above and cap 8 are overlapped each other. Using a seam welder, the overlapping section between metal frame 15 and seal ring section 9 are sealed by a welding means. Fig.1 illustrates a welding roller electrode section 11 of a seam welder by a dashed line (the other electrode is also located almost symmetrically; as not shown in the drawing). The heat generated during the seam welding is conducted to chip 2 of the solid image pick-up device and filter 4 at an only small amount. Filter 4 will not deteriorate due to the heat.

#### [Advantageous Result of the Invention]

The semiconductor solid image pick-up device of the invention demonstrate the following advantages without giving any heat charge to it, particularly the filter, by sealing the window frame like metal frame by a welding means and by bending it into an L shape: an improved optical yield; maintenance of the mechanical strength of the cap; sufficient air-tightness.

#### 4. Brief Description of the Invention

Fig.1 is a cross-sectional view illustrating a semiconductor solid image pick-up device as in an embodiment of the invention.

1...Laminate ceramic article

2...Chip

4...Filter

6...Transparent glass surface sheet

8...Cap

9...Seal ring section

11...Welding roller electrode

Translations Branch

U.S. Patent and Trademark Office

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